

**South Pacific coast region.**—From 26° at San Diego, California, on the 27th, to 39° Los Angeles, California, on the 15th.

## FROSTS.

In the various districts they were reported on the following dates:

**New England.**—1st to 5th, 7th to 31st.

**Middle Atlantic states.**—1st to 5th, 7th to 21st, 23d to 31st.

**South Atlantic states.**—1st to 5th, 7th to 12th, 14th, 16th to 21st, 24th, 25th, 27th, 28th, 30th, 31st.

**East Gulf states.**—1st to 4th, 8th, 9th, 11th, 12th, 16th, 17th, 18th, 23d to 31st.

**West Gulf states.**—1st, 2d, 3d, 6th, 7th, 8th, 10th, 11th, 13th, 14th, 16th, 17th, 18th, 21st to 31st.

**Rio Grande valley.**—1st, 2d, 8th, 11th, 13th, 16th, 17th, 23d, 28th, 29th, 30th.

**Tennessee.**—1st to 4th, 6th to 9th, 11th, 12th, 14th to 19th, 23d to 31st.

**Ohio valley.**—1st to 19th, 22d to 31st.

**Lower lake region.**—12th, 18th, 19th, 20th, 25th, 26th, 27th, 29th, 30th, 31st.

**Upper lake region.**—1st to 31st.

**Extreme northwest.**—1st to 31st.

**Upper Mississippi valley.**—1st to 31st.

**Missouri valley.**—1st, 2d, 3d, 6th, 7th, 8th, 10th to 19th, 22d to 31st.

**Northern slope.**—1st to 31st.

**Middle slope.**—1st to 8th, 10th to 19th, 21st, 22d, 23d, 25th, 27th to 31st.

**Southern slope.**—1st, 2d, 3d, 5th, 6th, 8th to 11th, 13th to 18th, 22d, 23d, 25th to 30th.

**Southern plateau.**—1st to 31st.

**Middle plateau.**—1st to 8th, 10th, 15th, 16th, 21st, 22d, 24th, 26th to 31st.

**Northern plateau.**—1st, 2d, 5th, 7th, 9th to 12th, 14th, 15th, 16th, 18th, 19th, 20th, 23d, 25th to 31st.

**North Pacific coast region.**—11th, 13th, 18th, 19th, 23d, 25th, 26th, 28th to 31st.

**Middle Pacific coast region.**—3d to 10th, 15th to 18th, 20th, 25th, 26th, 27th, 29th, 30th, 31st.

**South Pacific coast region.**—3d, 5th, 10th, 11th, 13th to 16th, 19th, 20th, 22d to 31st.

The occurrence of frosts has also been reported by the following stations not situated in the districts named above: Cedar Keys, Florida, 1st, 2d, 8th, 17th; Fort Brooke, Florida, 1st, 2d.

At New Orleans, on the 8th, considerable damage was done by the freeze, to the sugar-cane in some of the parishes.

At Mayport, Florida, the orange crop was injured by the freeze of the 17th.

## ICE.

The subject of the formation of ice in the northern sections, is considered elsewhere in the REVIEW, under the heading ICE IN RIVERS AND HARBORS. The following are exceptional cases of ice formation in the southern sections of the country.

**Alabama.**—Mobile, 1st, 8th, 9th, 17th, 30th; Auburn, 1st, 8th, 9th, 16th, 17th, 18th.

**Florida.**—Jacksonville, 8th, 17th, 18th; Pensacola, 8th; Mayport, 12th, 17th, 18th.

**Georgia.**—Atlanta, 7th, ice sufficiently thick to bear the weight of persons on the ponds in vicinity. Savannah, 1st, 8th; Augusta, 8th, 9th, 16th, 17th, 18th.

**Louisiana.**—New Orleans, 8th.

**North Carolina.**—Kittyhawk, 9th, bay frozen. Cape Lookout, 9th. Core Sound frozen for a distance of one hundred yards from the shore, with ice one-half inch in thickness.

**South Carolina.**—Charleston, 17th.

**Tennessee.**—Memphis, 1st, 3d, 7th, 8th, 15th; Chattanooga, 1st, 4th, 7th, 8th, 9th, 12th, 16th, 17th, 18th, 24th, 25th.

**Texas.**—Indianola, 8th, the water in the bay sufficiently cold to kill fish, numbers of which were picked up along the shore. Ice formed on the 8th and 16th. Palestine, 7th, 8th, 16th; Fredericksburg, 7th, 8th, 16th, 29th, 31st; Eagle Pass, 16th, 17th, 18th, 23d, 29th, 30th; Uvalde, 8th.

## PRECIPITATION.

(Expressed in inches and hundredths.)

The distribution of rainfall over the United States and Canada, as determined from observations taken at more than five hundred stations, is exhibited on chart iii. The table in the lower left-hand corner of this chart shows the average monthly rainfall, determined from the records of Signal Service stations, in the several districts; it shows also the excess or deficiency of precipitation as compared with the average of many years.

A very large excess of rainfall (6.86) is reported from the north Pacific coast region. In the northern plateau, northern slope, the lake region, south Atlantic states, and in Florida, excesses are reported varying from 0.06 to 0.45. In all the other districts, the rainfall is below the December average. The largest deficiencies are: Middle Pacific coast region, 4.14; Tennessee, 2.90; Ohio valley, 1.80; south Pacific coast region, 1.44; east Gulf states, 1.20.

## DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of comparative temperatures on the left-hand of chart iii.

The Chief Signal Officer is indebted to voluntary observers for the following interesting items bearing upon this subject. These comparisons are of special importance, as many of the records from which they are made cover long periods, some extending back many years before the establishment of the Signal Service:

**Illinois.**—Biley, monthly precipitation, 2.00, is 0.07 above the December average of twenty-one years. The total precipitation for the year of 1882 is 35.36, or 1.46 above the annual average of twenty-one years.

**Indiana.**—Logansport, monthly precipitation, 3.14, is 0.70 above the December average since 1860. The depth of snowfall for December, 1882, is 13.30 inches, or 4.48 above the average for December. During December, 1862, no snow fell; the greatest depth of snow for December, 24.11 inches, fell in 1872. In 1876, no rain fell during December; the largest December precipitation, 5.99, occurred in 1881. Vevay, monthly precipitation, 2.85, is 1.38 below the December average.

The following tables showing the monthly and annual rainfalls with the monthly and annual averages; and the rainfall by seasons, from 1866 to 1882, at Laconia, Indiana, have been furnished by Mr. Adam Crozier, of that place:

Table showing Monthly and Annual Rainfall at Laconia, Indiana.

Months.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	Monthly averages.
January.....	4.47	1.89	4.75	3.38	6.89	2.59	0.93	3.05	2.36	1.83	10.10	3.65	3.55	2.89	4.55	2.58	6.88	3.83
February.....	1.36	8.96	1.75	2.46	2.40	6.55	3.59	4.40	4.71	1.37	2.48	0.41	2.58	2.52	6.19	3.98	9.13	3.83
March.....	7.63	5.95	4.64	4.74	3.81	7.32	1.83	2.56	5.69	6.33	6.18	3.95	4.41	4.94	4.80	3.51	4.52	4.86
April.....	2.14	2.96	6.93	5.42	2.78	2.10	8.21	2.61	5.01	1.67	3.89	5.36	3.09	3.92	6.46	3.46	1.99	3.95
May.....	1.22	3.61	8.08	3.30	6.50	5.33	3.68	5.68	2.10	3.73	1.24	2.12	3.29	1.28	2.78	3.45	7.86	3.64
June.....	5.02	2.85	2.78	2.94	2.06	1.43	2.46	5.06	0.98	8.60	7.67	5.31	3.96	1.20	3.22	7.19	5.75	4.02
July.....	2.79	6.37	3.74	3.32	3.80	3.23	3.39	5.66	1.65	9.97	4.18	4.26	3.07	1.18	4.00	1.81	5.57	3.94
August.....	3.57	1.11	3.07	4.23	4.71	4.95	5.18	3.64	3.21	1.89	3.97	1.89	1.96	6.24	2.07	0.71	6.18	3.44
September.....	7.76	1.82	5.92	2.54	2.33	2.05	2.45	1.62	0.66	0.34	2.45	3.44	1.52	5.84	2.61	3.97	3.85	3.02
October.....	1.65	0.78	1.41	2.32	2.86	2.64	2.25	4.24	1.58	1.94	4.53	1.94	2.41	0.61	7.30	4.03	5.64	2.69
November.....	3.71	3.42	1.95	5.09	2.26	2.30	1.01	2.02	4.75	5.73	1.65	3.83	4.09	4.07	3.63	2.48	2.34	3.21
December.....	2.04	4.54	4.03	2.67	2.74	3.69	2.36	3.92	4.75	4.75	1.42	3.24	5.26	8.21	2.55	4.69	2.23	3.73
Annual sums.....	43.26	41.03	48.05	40.63	43.14	44.16	37.34	44.26	37.45	47.75	49.94	39.40	39.49	43.00	50.06	41.86	60.04	44.34
Monthly averages.....	3.60	3.67	4.00	3.39	3.59	3.68	3.11	3.69	3.12	3.98	4.16	3.28	3.29	3.58	4.18	3.49	5.00	3.70

Table showing Rainfall by Seasons, at Laconia, Indiana.

SEASONS.	1866-6.	1866-7.	1867-8.	1868-9.	1869-70.	1870-1.	1871-2.	1872-3.	1873-4.	1874-5.	1875-6.	1876-7.	1877-8.	1878-9.	1879-80.	1880-1.	1881-2.	Mean.
Winter.....	12.78	12.69	11.04	8.86	12.16	11.88	8.21	9.81	10.99	7.95	17.31	5.48	9.67	10.67	18.95	9.11	20.70	11.66
Spring.....	10.89	12.51	18.65	10.49	13.09	14.75	13.72	10.85	12.80	11.63	11.31	11.43	10.79	10.14	14.04	10.44	14.37	12.64
Summer.....	11.38	10.33	9.59	9.49	10.57	9.60	11.03	14.26	6.84	20.46	16.82	11.46	8.99	8.62	9.29	9.71	17.60	11.41
Autumn.....	13.12	6.00	9.28	9.95	7.45	6.98	5.71	7.78	6.99	7.71	8.83	9.21	8.02	10.63	13.44	10.48	9.93	8.91
Total for the year....	48.17	41.53	48.56	41.79	43.27	43.21	38.67	42.70	36.62	47.75	53.27	37.58	37.47	40.05	56.72	39.74	63.60	44.62

The following table, furnished by Dr. T. C. Hunter, of Wabash, Indiana, shows the monthly and annual precipitation at that place for the six years ending December 31, 1882:

MONTH.	1877.	1878.	1879.	1880.	1881.	1882.	Monthly averages.
January.....	1.39	1.76	1.47	3.41	1.07	1.70	1.78
February.....	0.02	3.57	1.13	1.06	4.47	3.98	2.62
March.....	5.22	2.29	4.06	2.58	2.27	3.94	3.23
April.....	1.53	2.02	1.96	4.74	1.19	4.32	2.78
May.....	1.38	4.47	2.46	8.86	1.34	4.63	3.66
June.....	6.14	2.16	4.42	5.74	5.71	5.25	4.90
July.....	2.76	3.28	3.48	1.18	2.69	4.26	2.93
August.....	3.10	4.33	1.89	5.47	0.65	4.97	3.30
September.....	0.90	3.02	4.54	1.28	3.79	0.39	2.32
October.....	4.58	2.44	0.75	1.44	6.96	3.03	3.20
November.....	3.44	2.51	4.28	2.27	4.73	3.08	3.38
December.....	0.85	2.89	3.78	1.16	5.87	1.77	2.72
Sums.....	31.21	36.63	33.72	40.09	40.94	40.32	36.92
Means.....	2.60	2.97	2.81	3.34	3.41	3.36	3.08

**Iowa.**—Iowa city, the following extract is taken from "Press Bulletin," number 116, for December, 1882, published by Dr. Gustavus Hinrichs, Director of the Iowa Weather Service:

\* \* \* The total precipitation was about 30 per cent. above the normal throughout the state; it averaged one inch in the west and two inches in the east.

**Kansas.**—Wellington, monthly precipitation, 0.67, is about the December normal. The total precipitation for the year 1882 is 36.00, or 6.79 above the annual average of four years. The snowfall for 1882 is 15.5 inches, or 5 inches above the annual average. Yates Centre, monthly precipitation, 3.35, is 0.46 above the December average of the last three years. Lawrence, monthly precipitation, 1.24, is 0.41 below the December average of the last fifteen years. During that period, the largest monthly precipitation, 4.39, occurred in 1873; the smallest, 0.43, occurred in 1876 and 1880. The following table is compiled from the annual summary prepared by Professor F. H. Snow, of the State University, Lawrence, Kansas, and is interesting as showing the annual rainfall (including melted snow); the annual snowfall; the total number of days on which rain or snow fell; with the percentages of mean relative humidity and mean cloudiness, for each year from 1868 to 1882, inclusive:

Year.	Annual rainfall.	Annual snowfall.	Number of rainy days.	Relative humidity.	Mean cloudiness.
				Percentages.	Percentages.
1868.....	37.48	27.60	77	75.2	48.35
1869.....	33.51	18.00	105	68.4	49.23
1870.....	31.32	9.50	100	68.4	47.88
1871.....	32.23	29.75	120	65.9	47.37
1872.....	32.63	23.25	116	64.4	44.33
1873.....	32.94	28.00	101	64.0	42.46
1874.....	28.87	45.00	99	65.7	45.54
1875.....	28.87	6.00	106	66.7	44.81
1876.....	44.18	24.75	102	66.8	41.27
1877.....	41.09	15.50	126	72.6	47.12
1878.....	38.39	25.50	107	70.2	40.65
1879.....	32.68	10.35	90	67.1	40.01
1880.....	32.65	7.00	89	67.9	40.15
1881.....	33.27	32.60	110	70.1	47.52
1882.....	27.60	18.00	102	68.6	46.41
Means of 15 years.....	34.25	21.07	103	68.3	44.40

MONTH.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	Monthly average.
January.....	4.55	2.65	2.30	2.00	4.20	2.50	5.00	1.00	3.40	4.40	3.40	1.05	4.45	6.75	3.404
February.....	3.00	3.15	4.00	4.80	6.05	4.20	3.85	3.55	1.40	1.10	2.90	2.40	3.85	4.80	3.475
March.....	2.80	3.25	6.85	5.25	1.70	3.80	7.10	4.20	5.15	4.60	4.40	6.35	5.05	3.95	4.582
April.....	1.10	3.00	3.20	3.00	1.95	6.15	3.05	3.75	4.50	5.10	2.25	1.35	4.15	2.35	3.207
May.....	4.75	5.75	2.90	3.20	5.55	3.90	2.45	3.70	2.80	4.65	0.50	1.45	0.70	3.80	3.279
June.....	3.80	3.20	4.15	2.55	1.45	2.90	4.25	3.30	2.40	2.80	2.30	4.60	8.15	1.00	3.368
July.....	3.55	3.40	5.00	3.95	1.25	4.90	6.60	4.85	8.90	2.30	3.30	6.25	7.00	2.85	4.693
August.....	0.20	0.45	5.30	1.20	2.80	1.90	11.25	2.00	1.70	6.80	10.85	10.00	2.40	4.10	4.354
September.....	2.20	1.05	4.70	1.45	4.40	4.25	3.95	7.70	5.00	1.10	2.85	1.95	0.95	4.45	3.286
October.....	3.75	2.65	4.10	9.25	5.25	0.05	2.55	1.25	5.10	3.65	0.90	2.25	2.50	4.75	5.414
November.....	2.25	2.00	4.70	3.40	3.85	2.15	3.45	4.60	3.85	2.80	0.40	5.10	4.60	1.00	3.146
December.....	2.55	2.15	2.20	6.35	4.20	3.80	2.90	1.70	2.40	5.25	4.50	6.75	1.55	4.75	3.688
Annual sums.....	34.50	32.60	49.20	46.70	42.65	40.50	56.30	41.40	46.40	44.45	38.55	49.50	45.35	44.55	48.761
Monthly average.....	2.88	2.72	4.10	3.89	3.55	3.38	4.69	3.45	3.87	3.70	3.21	4.11	3.78	3.71	3.647

**Maine.**—Gardiner, monthly precipitation 3.53, or 0.25 below the December average of a period of forty-six years. The precipitation for the year 1882 is 41.77, or 2.43 below the annual average; the total precipitation for the three months ending December 31, 1882, is but little more than one-half of the average of the corresponding months in previous years.

**Maryland.**—Fallston, monthly precipitation, 1.48, is 1.78 below the December average of the last thirteen years. During that period, the largest December precipitation, 7.02, occurred in 1878; the smallest, 1.27, occurred in 1873. The total precipitation for the year 1882 is 42.99, or 3.22 below the annual average of twelve years. The total precipitation for the three months ending December 31, 1882, is only 2.72.

**Missouri.**—The Missouri Weather Service reports the monthly precipitation at Saint Louis to be 1.75, which is 1.22 below the average for December.

**New Hampshire.**—Grafton, monthly precipitation, 2.32, is 2.18 below the December average of the last three years. Antrim, monthly precipitation, 2.45, is 1.13 below the December average of the last ten years.

**New York.**—North Volney, monthly precipitation, 3.35, is 0.06 below the December average of eleven years. During that period, the largest December precipitation, 8.35, occurred in 1878; the smallest, 1.80, occurred in 1875. The total precipitation for the year 1882, 29.90, is 6.72 below the annual average of a period of ten years. The largest annual precipitation of that period was 48.35, in 1878; the smallest, 29.90, in 1882. Rain or snow fell on one hundred and eighty-two days during the year, which is seven days less than for any year during the period covered by the record. Palermo, monthly precipitation, 3.51, is 0.50 below the December average of twenty-nine years. The largest December precipitation of that period, 7.90, occurred in 1878; the smallest, 1.60, occurred in 1874. The total snowfall for December, 1882, is twenty-six inches, or eight inches more than the December average of the last twenty-nine years. During that period, the largest December snowfall, sixty-eight inches, occurred in 1868; the least, four inches, fell in 1881. The total snowfall for the year 1882 is fifty inches, or forty-seven inches below the annual average. In 1856, snow fell to a depth of one hundred and eighty-five inches, being the largest annual snowfall; the least is that for 1882.

**Virginia.**—Wytheville, monthly precipitation, 2.45, is below the December average of a period of seventeen years. The total precipitation for the year 1882 is 8.69 above the annual average, and has been exceeded only in 1861 and 1878, when the amounts were 51.00 and 52.50, respectively.

The following table, furnished by Mr. C. R. Moore, of Snowville, Virginia, shows the precipitation for each month and year, from January, 1869, to December, 1882, with the monthly and annual averages:

Table of Excessive, Greatest and Least Monthly Rainfalls.

STATION.	SPECIAL HEAVY.			Largest Monthly.	SMALLEST MONTHLY.	
	Date.	Amt.	Duration	Amount.	STATION.	Amt.
Alabama.					Arizona.	
Mount Vernon Barracks	19	3.80			Casa Grande	0.00
Mobile	20, 21	2.90			Maricopa	0.00
Florida.					Pantano	0.00
Fort Barrancas	21	2.20		7.25	Phoenix	0.00
Do.	10	1.15	8 h.		Prescott	0.00
Pensacola	21, 22	2.30		6.13	Texas Hill	0.00
Georgia.					Yuma	0.00
Fort Quitman	13	2.71		6.62	Tucson	0.04
Idaho.					Fort Verde	0.17
Lewiston					Fort Apache	0.08
Mississippi.					Fort Lowell	0.12
Vicksburg	19	3.70			Benson	0.15
Fayette	19	2.60			San Simon	0.20
North Carolina.					Willcox	0.32
Hatteras	29, 30	3.15		6.86	Fort Bowie	0.35
Kittyhawk	30	2.57			Camp Thomas	0.46
Oregon.					California.	
Portland	12, 13	10.75		20.14	Anaheim	0.00
Eola	12, 13	3.68		9.76	Delano	0.00
Fort Stevens				9.26	Lemore	0.00
Albany	13	3.27			Mammoth Tank	0.00
Texas.					Mojave	0.00
Galveston	18, 19	2.72			Indio	0.00
Virginia.					Ravenna	0.00
Norfolk	30	2.48		6.09	San Fernando	0.00
Cape Henry	30, 31	2.07			Soldad	0.00
Chincoteague	10	2.48			Spadra	0.00
Washington Territory.					Summer	0.00
Fort Canby				12.46	White Water	0.00
Bainbridge Island				7.35	Kingsburg	0.08
Dayton	13	3.69		7.12	Borden	0.07
Colfax				6.42	Merced	0.07
					Goshen	0.08
					Los Angeles	0.08
					Modesto	0.12
					San Diego	0.13
					Visalia	0.15
					Tennant	0.20
					Tracy	0.20
					Gilroy	0.21
					Crafton	0.25
					Galt	0.25
					Ione	0.25
					San Jose	0.25
					Poway	0.27
					Stockton	0.27
					Byron	0.32
					Williams	0.33
					Knight's Landing	0.34
					Caliente	0.37
					Lathrop	0.37
					Livermore	0.38
					Monterey	0.39
					Martinez	0.46
					Keene	0.47
					Willows	0.49
					Tehachapi	0.50
					Colorado.	
					West Las Animas	0.08
					Pagoda Springs	0.40
					Pike's Peak	0.44
					Dakota.	
					Fort Bennett	0.05
					Fort Sal y	0.06
					Fort Yates	0.06
					Fort Hale	0.11
					Fort Meade	0.12
					Huron	0.25
					Alexandria	0.25
					Wicklow	0.26
					Fort Buford	0.27
					Rapid City	0.40
					Fort Totten	0.40
					Bismarck	0.43
					Morrison	0.50
					Indian Territory.	
					Fort Supply	0.03
					Fort Sill	0.33
					Kansas.	
					Salina	0.03
					Pretty Prairie	0.60
					Montana.	
					Fort Keogh	0.74
					Fort Shaw	0.37
					Helena	0.48
					Nevada.	
					Terrace	0.10
					Wadsworth	0.20
					Beowaves	0.23
					Kelton	0.23
					Golconda	0.25
					Battle Mountain	0.30
					Halleck	0.30
					Carson City	0.34
					Corinne	0.40
					Carlin	0.45
					Blue Creek	0.50
					New Mexico.	
					Fort Bayard	t'ce
					Fort Union	0.16
					Deming	0.20
					Lordsburg	0.20
					New Jersey.	
					Phillipsburg	0.45

Table of Excessive, Greatest and Least Monthly Rainfalls.—Continued.

STATION.	SPECIAL HEAVY.			Largest Monthly.	SMALLEST MONTHLY.	
	Date.	Amt.	Duration	Amount.	STATION.	Amt.
					New York.	
					Friendship	0.35
					Texas.	
					El Paso	0.00
					Fort Concho	t'ce
					Brackettville	0.02
					Fort Davis	0.02
					Henrietta	0.06
					Eagle Pass	0.06
					Uvalde	0.17
					Fort Stockton	0.22
					Fort Elliott	0.40
					Wyoming.	
					Cheyenne	0.10
					Fort Bridger	0.35

The following table shows the greatest and least numbers of rainy and cloudy days, and percentages of mean relative humidity, as reported from the various districts:

Table of rainy and cloudy days and relative humidity for December, 1882.

Districts.	Rainy days	Cloudy days.	Relative humidity.*
	From 8 to 20	From 5 to 11	Percentages.
New England	7 " 21	2 " 15	60.1 " 77.9
Middle Atlantic states	9 " 17	4 " 11	65.1 " 83.8
South Atlantic states	7 " 11	3 " 11	76.9 " 83.2
Florida peninsula	8 " 14	5 " 10	66.7 " 77.0
Eastern Gulf states	5 " 15	3 " 8	62.0 " 79.3
Western Gulf states	1 " 11	4 " 8	56.6 " 78.7
Rio Grande valley	10 " 21	7 " 18	64.1 " 76.0
Ohio valley and Tennessee	19 " 26	17 " 27	71.1 " 86.7
Lower lake region	16 " 27	12 " 29	72.6 " 87.0
Upper lake region	5 " 14	6 " 11	67.1 " 89.1
Extreme northwest	12 " 21	13 " 16	65.7 " 85.4
Upper Mississippi valley	7 " 12	7 " 11	61.2 " 76.3
Missouri valley	3 " 13	4 " 11	47.4 " 77.9
Northern slope	1 " 10	1 " 4	52.3 " 77.8
Middle slope	1 " 6	0 " 5	55.5 " 69.8
Southern slope	0 " 7	0 " 2	48.8 " 61.7
Southern plateau	4 " 12	2 " 11	49.9 " 71.4
Middle plateau	8 " 17	7 " 21	74.1 " 85.5
Northern plateau	20 " 24	16 " 21	82.7 " 85.5
North Pacific coast region	7 " 8	2 " 5	75.8 " 82.6
Middle Pacific coast region	0 " 5	0 " 1	39.2 " 78.0
South Pacific coast region			

\* Relative humidity corrected for altitude.

## HAIL.

The dates on which hail storms occurred in the various states and territories are as follows:

Connecticut.—New Haven, 3d.

Dakota.—Fort Lincoln, 3d, 8th.

Georgia.—Atlanta, 7th, 20th.

Kansas.—Yates Centre, 6th, 31st.

Montana.—Fort Maginnis, 8th.

North Carolina.—Hatteras, 3d; Lenoir, 26th; Weldon, 29th, 30th.

Pennsylvania.—Catawissa, 10th; Grampian Hills, 13th; Dyberry, 21st.

Tennessee.—Austin, 20th.

Washington Territory.—Fort Canby, 19th.

## SNOW.

The dates on which snow fell in the various districts are as follows:

New England.—1st to 31st.

Middle Atlantic states.—2d to 5th, 7th, 8th, 10th, 11th, 13th, 15th to 21st, 23d, 26th to 30th.

South Atlantic states.—3d, 15th to 20th, 27th to 30th.

Tennessee.—15th, 17th, 28th, 29th, 30th.

Ohio valley.—2d, 3d, 5th, 6th, 7th, 9th to 18th, 22d to 29th, 31st.

Lower lake region.—1st to 28th, 30th, 31st.

Upper lake region.—1st to 31st.

Extreme northwest.—1st to 13th, 16th to 21st, 25th, 27th, 29th, 30th.

Upper Mississippi valley.—1st to 31st.

Missouri valley.—1st, 4th, 5th, 6th, 8th, 9th, 10th, 12th to 15th, 18th to 21st, 23d to 26th, 28th to 31st.

Northern slope.—1st, 4th to 25th, 26th to 30th.

*Middle slope.*—6th to 9th, 14th, 15th, 18th to 27th, 29th, 30th, 31st.

*Southern slope.*—18th, 21st, 22d, 24th, 26th, 27th, 30th, 31st.

*Southern plateau.*—7th, 19th, 20th, 21st, 23d, 27th, 30th, 31st.

*Middle plateau.*—6th, 8th, 9th, 11th to 20th, 23d, 25th, 29th, 30th, 31st.

*Northern plateau.*—6th to 14th, 17th to 25th, 27th, 28th, 29th. Snow also fell in the following states and territories not included in the districts named above:

*Alabama.*—Auburn, 15th; Montgomery, 29th.

*Arkansas.*—Fort Smith, 15th, 29th, 31st; Little Rock, 15th, 31st.

*California.*—Fort Bidwell, 10th, 18th to 22d, 24th, 28th, 29th; Sacramento, 31st; San Francisco, 31st; Visalia, 31st.

At Oakwood, California, on the 12th, snow fell throughout the day, reaching a depth of about four inches on the level. This is the first snowfall occurring at this station during the observer's residence of several years; and no authentic precedent has been heard of. Great damage was done to timber, especially to live-oaks. The evergreen foliage being overloaded with snow, an immense number of limbs and many whole trees were broken down, obstructing travel.

*Louisiana.*—Point Pleasant, 22d.

*Mississippi.*—Agricultural College, 15th.

*Washington Territory.*—12th, 17th to 20th, 23d, 28th, 29th.

#### LARGEST MONTHLY SNOWFALLS.

[Expressed in inches.]

The following are the largest monthly snowfalls reported from the various states and territories during the month:

*California.*—Summit, 49.5; Emigrant Gap, 30; Cisco, 28.75; Alta, 7; Oakland, 4.

*Colorado.*—Denver, 7.5; Pike's Peak, 4.5.

*Connecticut.*—New London, 4.

*Dakota.*—Fort Randall, 22; Fort Stevenson, 7; Yankton, 7; Morrilton, 4; Bismarck, 3.75.

*Idaho.*—Eagle Rock, 12.

*Illinois.*—Riley, 12; Springfield, about 10; Morrison, 8.75; Rockford, 8.5; Charleston, 7; Bunker Hill, 6; Mattoon, about 5; Peoria, 3.5.

*Indiana.*—Logansport, 13.25; Fort Wayne, 9.25; Wabash, 7.25; Lafayette, 6.5; New Harmony, 5.

*Iowa.*—Des Moines, 23; Logan, 21; Independence, 15.5; Indianola, 15; Dubuque, 13; Humboldt, 11; Monticello, 10.75; Ames, 8.75; Cedar Rapids, 7.5; Cresco, 7.5; Clinton, 7.25; Fort Madison, 7; Keokuk, 4.5; Muscatine, 4.

*Kansas.*—Lawrence, 5; Leavenworth, about 5; Creswell, 4.50; Holton, 4; Yates Centre, 3.5; Salina, 3.

*Kentucky.*—Bowling Green, 3; Frankfort, 3.

*Maine.*—Dexter, 29; Cornish, 27; Gardiner, 22; Orono, 21; Portland, about 13; Eastport, about 8.

*Massachusetts.*—Provincetown, about 15; Rowe, 11.5; Westborough, 8; Milton, 7; Princeton, 6.75; Charleston, 6.5; Dudley, 6.25; Springfield, about 6; Boston, 4.25; Menden, 4.

*Michigan.*—Traverse City, 47; Northport, 40; Mackinac City, 36.5; Marquette, about 25; Port Huron, 21.5; Alpena, 21.25; Harrisville, 20; Escanaba, 15.5; Thornville, 12.5; Battle Creek, 11.5; Litchfield, 11.25; Hillsdale, 10.5; Hastings, 10; Marshall, 9.25; Detroit, about 9.

*Minnesota.*—Northfield, 26; Minneapolis, 20; Moorhead, 13.75; Duluth, 11; Saint Paul, 7.5; Saint Vincent, 7.25.

*Missouri.*—Corning, 12.

*Montana.*—Fort Assiniboine, 13.5; Fort Custer, 12; Fort Benton, 10; Helena, 4.75; Fort Shaw, 4.75.

*Nebraska.*—Clear Creek, 13.5; De Soto, 9; Genoa, 8; Ord, 7.25; North Platte, 6.5; Omaha, about 4.

*Nevada.*—Otego, 14; Wells, 11; Fort McDermitt, 10.75; Truckee, 8; Elko, 7; Palisade, 6.75; Boca, 6; Humboldt, 5.5; Tecoma, 4; Winnemucca, 3.5.

*New Hampshire.*—Ashland, about 35; Woodstock, about 35; Bristol, about 28; Mount Washington, 26.5; Wier's Bridge, about 25; Wolfborough, about 25; Lake Village, 20.75; Bel-

mont, about 20; Grafton, 19; Antrim, 11.50; New Market, 8.25. *New Mexico.*—Santa Fé, 5.50.

*New York.*—Oswego, about 45; Palermo, 26; Friendship, 18; Madison Barracks, 14.50; Rochester, 14; Ithica, 13; Buffalo, 10.50; Albany, 9.50; Port Jervis, 8.50; Johnstown, 8; Cooperstown, 7; Elmira, 5.50; Factoryville, 4.75; Ardenia, 4; Penn Yan, 4.

*North Carolina.*—Highlands, 12; Ore Knob, 10; Kittyhawk, 5.

*Ohio.*—Cleveland, 16; Ruggles, 9; Marion, 7; Sandusky, 6; North Lewisburg, 5.25; Toledo, 5.25; College Hill, 4.50; Jacksonburg, 4; Westerville, 3.25; New Athens, 3.

*Pennsylvania.*—Erie, 16.75; Grampian Hills, 14.75; Dyberry, 7.50; Wellsboro', 7; Pittsburg, about 6; Williamsport, 6; Chambersburg, 4.

*Rhode Island.*—Newport, about 5.

*Tennessee.*—Austin, 3.

*Utah.*—Salt Lake City, about 6.50; Promontory, 6; Ogden, 4.25; Corinne, 4; Blue Creek, 4.

*Vermont.*—Charlotte, 33; Woodstock, 32; Newport, 31; Strafford, 29; Lunenburg, 24.

*Virginia.*—Variety Mills, 10.25; Wytheville, 8.

*West Virginia.*—Helvetia, 13.

*Wisconsin.*—Embarras, 23.75; Madison, 20; Ripon, 15.75; Franklin, 10.50; Beloit, 8.75; Manitowoc, 8.

*Wyoming.*—Fort Washakie, 5.25.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF MONTH.

[Expressed in inches.]

*Arkansas.*—Fort Smith, 0.75; Mount Ida, trace.

*California.*—San Francisco, 2.00.

*Colorado.*—Pike's Peak, 4.00; Denver, 1; West Las Animas, trace.

*Dakota.*—Bismarck, 4.00; Alexandria, 2.00; Fort Stevenson, 1.50; Huron, 1.50; Wicklow, 1.25; Morrilton, 1.00; Fort Benet, trace; Yankton, trace.

*Idaho.*—Boisé City, 5; Lewiston, 3.50; Eagle Rock, 3.25.

*Illinois.*—Riley, 4; Morrison, 1.50; Bunker Hill, 1.00; Champagne, 0.50; Charleston, 0.50; Chicago, trace; Springfield, trace.

*Indiana.*—Lafayette, 2.00; Fort Wayne, 1.00; Indianapolis, 0.50.

*Indian Territory.*—Fort Sill, 2.00.

*Iowa.*—Humboldt, 6.00; Cresco, 5.00; Independence, 4.00 to 12.00; Indianola, 4.00 to 6.00; Ames, 4.50; Cedar Rapids, 3.00; Des Moines, 3.00; Monticello, 3.00; Guttenberg, 2.50; Dubuque, 2.00; Keokuk, 0.75; Clinton, trace.

*Kansas.*—Independence, 1.50; Leavenworth, 1.00; Yates Centre, 1.00; Wellington, 0.75; Creswell, 0.50; Holton, trace.

*Kentucky.*—Frankfort, 3.00.

*Maine.*—Gardiner, 14.00; Orono, 12.00; Eastport, 7.00; Portland, 3.00.

*Massachusetts.*—Rowe, 10.00; Williamstown, 5.00; Westborough, 3.00; Menden, 1.00; Springfield, trace.

*Michigan.*—Northport, 24.00; Marquette, about 12.00; Mackinac City, 8.00; Hastings, 6.00; Hillsdale, 3.50; Escanaba, 3.00; Grand Haven, 2.50; Litchfield, 1.50; Alpena, 1.00; Lansing, 0.50; Port Huron, trace.

*Minnesota.*—Saint Paul, 11.00; Moorhead, 10.00; Duluth, 6.00; Saint Vincent, 5.00.

*Missouri.*—Corning, 4.00; Protom, 3.25; Springfield, 1.50; Pierce City, 1.00; Bedford, 0.50; Saint Louis, trace.

*Montana.*—Fort Custer, 9.00; Fort Benton, 6.00; Fort Keogh, 5.00; Fort Assiniboine, 4.00; Fort Shaw, 3.75; Fort Missoula, 2.00; Helena, 2.00.

*Nebraska.*—Clear Creek, 6.00; De Soto, 3.00; Genoa, 3.00; Omaha, 3.00; North Platte, 1.00.

*New Hampshire.*—Grafton, 15.00; Mount Washington, 12.00; New Market, 4.00.

*New Jersey.*—South Orange, 1.00; Cape May, 0.33.

*New Mexico.*—Santa Fé, 3.00 to 12.00.

*New York.*—Palermo, 17.00; Friendship, 8.00; Johnstown, 8.00; Oswego, 8.00; Cooperstown, 7.00; Albany, 2.00; Buffalo, trace; Ithica, trace.

*North Carolina.*—Charlotte, 4.00.

*Ohio.*—Ruggles, 2.00; North Lewisburg, 1.00; Jacksonburg, 1.00; Toledo, 0.50; Westerville, 0.50; Cleveland, trace; Columbus, trace; New Athens, trace.

*Oregon.*—Umatilla, trace.

*Pennsylvania.*—Grampian Hills, 8.00; Dyberry, 5.00; Wellsborough, 2.25; Erie, 2.00; Pittsburg, 0.50.

*Texas.*—Denison, 1.75; Coleman City, 1.25; Jacksborough, 1.00.

*Utah.*—Salt Lake City, trace.

*Vermont.*—Charlotte, 24.00; Newport, 20.00; Strafford, 18.00; Woodstock, 14.00.

*Virginia.*—Lynchburg, 4.00; Variety Mills, 4.00; Wytheville, 2.00; Accotink, trace.

*Washington Territory.*—Spokane Falls, 2.00.

*Wisconsin.*—Embarrass, 12.00; Ripon, 8.00; La Crosse, 3.50; Beloit, 2.00; Madison, 0.50; Milwaukee, 0.50.

*Wyoming.*—Fort Washakie, 3.50; Cheyenne, trace.

#### SNOW FROM A CLOUDLESS SKY.

Williamsport, Pennsylvania, 26th.—At 3.45 p. m., a heavy snow-storm began, which lasted until 4.30 p. m., after which light snow continued until 6.00 p. m., when the clouds suddenly disappeared, and it continued snowing from a cloudless sky for several minutes.

Huron, Dakota, 10th.—Snow fell from a cloudless sky from 7.00 to 9.00 a. m., presenting a beautiful appearance between the observer and the sun.

#### SLEET.

Fort Sully, Dakota, 18th.

Fort Totten, Dakota, 16th.

Fort Warren, Massachusetts, 23d.

Fort Assinniboine, Montana, 1st.

West Point, New York, 21st.

Morrison, Illinois, 19th, 20th.

Mattoon, Illinois, 9th.

Yates Centre, Kansas, 26th.

Charlestown, Massachusetts, 11th.

Freehold, New Jersey, 10th.

Vineland, New Jersey, 10th.

Bordentown, New Jersey, 10th.

Lenoir, North Carolina, 20th.

Blooming Grove, Pennsylvania, 21st.

West Chester, Pennsylvania, 10th.

Chambersburg, Pennsylvania, 9th.

Ripon, Wisconsin, 19th.

Portland, Maine, 23d.

New London, Connecticut, 21st.

Burlington, Vermont, 21st, 22d.

Washington, District of Columbia, 13th.

Norfolk, Virginia, 29th.

Albany, New York, 21st, 22d.

Atlantic City, New Jersey, 30th.

Atlanta, Georgia, 19th.

Sloop Point, North Carolina, 28th.

Louisville, Kentucky, 6th.

Columbus, Ohio, 9th.

Nashville, Tennessee, 28th.

Logansport, Indiana, 5th, 20th.

Cleveland, Ohio, 10th.

Toledo, Ohio, 5th, 20th, 27th.

Detroit, Michigan, 31st.

Rochester, New York, 20th.

Buffalo, New York, 10th.

Oswego, New York, 21st.

Mackinac City, Michigan, 19th, 20th.

Grand Haven, Michigan, 1st, 4th, 20th.

Milwaukee, Wisconsin, 2d.

Marquette, Michigan, 19th.

Escanaba, Michigan, 21st.

Chicago, Illinois, 19th, 23d.

Alpena, Michigan, 19th.

Tobacco Garden, Dakota, 3d, 23d.

Dubuque, Iowa, 4th, 19th.

Duluth, Minnesota, 20th.

Madison, Wisconsin, 19th.

Saint Paul, Minnesota, 20th.

Springfield, Illinois, 18th.

Cheyenne, Wyoming, 14th.

Fort McKavett, Texas, 31st.

#### WINDS.

The prevailing direction of the winds during the month of December, 1882, at Signal Service stations are shown on chart ii. by arrows flying with the wind. In the Southern states the prevailing winds are from the north; in the lower lake region, from the west and southwest; along the Atlantic coast and in the Upper Mississippi and Missouri valleys, they are mostly from the northwest; on the Pacific coast they are variable.

#### TOTAL MOVEMENTS OF THE AIR.

[In miles.]

The following are the largest total movements at the Signal Service stations: On the summit of Mount Washington, New Hampshire, 23,411; Cape May, New Jersey, 12,901; Pike's Peak, Colorado, 12,548; Hatteras, North Carolina, 12,279; Delaware Breakwater, Delaware, 11,809; Kittyhawk, North Carolina, 11,719; Barnegat, New Jersey, 10,573; Block Island, Rhode Island, 10,407; Rochester, New York, 10,087; Port Eads, Louisiana, 10,081; Indianola, Texas, 10,053; Buffalo, New York, 9,948; Galveston, Texas, 9,842; Erie, Pennsylvania, 9,749; Sandy Hook, New Jersey, 9,558; Sandusky, Ohio, 9,474; Fort Shaw, Montana, 9,459; Cape Henry, Virginia, 9,455; Mackinac City, Michigan, 9,397; Champaign, Illinois, 9,096; Milwaukee, Wisconsin, 8,946; Grand Haven, Michigan, 8,757; Oswego, New York, 8,732; Eastport, Maine, 8,545; Moorhead, Minnesota, 8,398; Provincetown, Massachusetts, 8,349; Fort Macon, North Carolina, 8,225; Cleveland, Ohio, 8,167; Newport, Rhode Island, 8,108; Fort Assinniboine, Montana, 8,011. The smallest total movements are: Visalia, California, 1,772; Silver City, New Mexico, 2,156; Fort Missoula, Montana, 2,255; Boise City, Idaho, 2,276; Lynchburg, Virginia, 2,284; Lewiston, Idaho, 2,395; Tucson, Arizona, 2,447; Dubuque, Iowa, 2,917.

#### HIGH WINDS.

Maximum velocities of fifty miles per hour or more have been reported as follows: On the summit of Mount Washington, New Hampshire, 69 nw., 1st; 54, nw., 2d; 72 nw., 3d; 70 sw., 4th; 84 w., 5th; 116 nw., 7th (maximum for month); 98 nw., 8th; 104 nw., 9th; 61 w., 10th; 83 e., 13th; 98 nw., 14th; 72 nw., 15th; 78 nw., 17th; 60 se., 22d; 66 e., 23d; 72 nw., 24th; 52 n., 28th; 68 nw., 29th; 68 nw., 30th; 96 nw., 30th.

On the summit of Pike's Peak, Colorado, 52 w., 1st; 64 nw., 3d; 72 nw., 4th; 62 w., 5th; 60 nw., 6th; 66 nw., 7th; 66 w., 8th; 54 w., 9th; 68 w., 10th; 86 w., 11th, (maximum for month).

Fort Sill, Indian Territory, 56 n., 7th.

Fort Stevenson, Dakota, 52 nw., 3d.

Indianola, Texas, 59 n., 7th.

Cape May, New Jersey, 62 nw., 7th.

Chincoteague, Virginia, 53 nw., 7th.

Kittyhawk, North Carolina, 66 ne., 30th.

Hatteras, North Carolina, 72 n., 30th.

Delaware Breakwater, Delaware, 52 nw., 3d; 57 n., 7th.

#### VERIFICATIONS.

##### INDICATIONS.

The detailed comparison of the tri-daily indications for December, 1882, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 87.56 per cent. The percentages for the four elements are: Weather, 89.40; direction of the wind, 83.23; temperature, 89.89; barometer, 87.70 per cent. By geographical districts, they are: For New England, 88.2; middle Atlantic states, 87.1; south Atlantic states, 88.1; eastern states, 86.5; western Gulf states, 88.8; lower lake region,